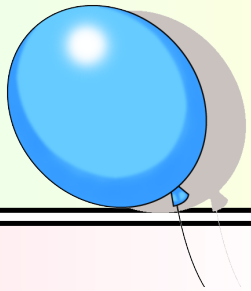
(c)		pressure in terms of this model	HSW1, 2 Explanation of pressure in terms of Newtonian theory.
(d)	**(i)**	the equation of state of an ideal gas $pV = nRT$, where n is the number of moles	

(6) M - Describe how gases exert a pressure on a surface
(7) S - Describe the relationship between pressure, temperature, volume and amount of a substance
(8) C - Explain in terms of kinetic theory why changing V, P, T or n will affect another quantity.

Lesson 2. Gas laws

STARTER: Write down 3 ideal gas assumptions....



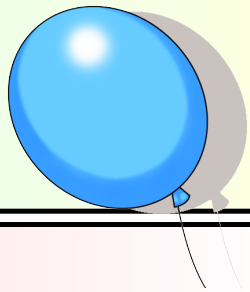
Kilo 10^3
Mega 10^6 Which are the key terms you cannot do without?
Giga 10^9

Key point

(6) M - Describe how gases exert a pressure on a surface
(7) S - Describe the relationship between pressure, temperature, volume and amount of a substance
(8) C - Explain in terms of kinetic theory why changing V, P, T or n will affect another quantity.

0:03:53

ACTIVITY 1: Complete this PPQ about gas pressure



Kilo 10^3
Mega 10^6
Giga 10^9

Hint: Think about Newton's laws

Support your answer with a diagram and a mathematical approach

Gas molecules are said to make perfectly elastic collisions with one another.

i State what is meant by a **perfectly elastic collision**.

..... Where kE is conserved ..... *(1 mark)*

ii Explain, in terms of the behaviour of its **molecules**, how a gas exerts a pressure on the walls of its container.

.....

.....

.....

..... *(4 marks)*

Key point

Collision in which no **kinetic** energy is lost	B1
A change in momentum occurs when molecule(s) collide with (and rebound from) the walls of container	B1
Hence, walls exerts a force on the molecule (by Newton's second law)	B1
The (total) force exerted by the molecules on the wall is equal to (total) force exerted by the wall on the molecules (by Newton's third law)	B1
$\text{pressure} = \frac{\text{total force on wall}}{\text{area of wall}}$	B1

Gas molecules are said to make perfectly elastic collisions with one another.

i State what is meant by a **perfectly elastic collision**.

.....

.....

.....

.....

(*1 mark*)

ii Explain, in terms of the behaviour of its **molecules**, how a gas exerts a pressure on the walls of its container.

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(*4 marks*)

Gas molecules are said to make perfectly elastic collisions with one another.

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(*4 marks*)

(6) M - Describe how gases exert a pressure on a surface
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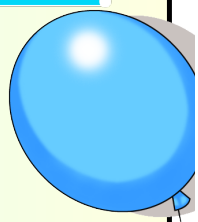
Investigating gases using phet

ACTIVITY 2: Check your emails - open up 'gas properties on 'phet'

Complete the worksheet to find out the gas laws



Kilo 10^3

Mega 10^6

Giga 10^9

Ex:

Variables	Nature of relationship	Constant parameters		Describe why in terms of kinetic theory of matter
V vs P	$P \alpha \frac{1}{V}$	T, n		Explain why decreasing the volume of a gas at constant temperature increases the pressure.
V vs T	$V \alpha T$			
T vs P	$T \alpha P$			
Moles vs V	$V \alpha n$			

(6) M - Describe how gases exert a pressure on a surface
(7) S - Describe the relationship between pressure, temperature, volume and amount of a substance
(8) C - Explain in terms of kinetic theory why changing V, P, T or n will affect another quantity.

Summary

- Boyle's law $p \propto 1 / V$ $pV = \text{constant}$
- Charles' law $V \propto T$ $V / T = \text{constant}$
- Pressure law $p \propto T$ $p / T = \text{constant}$

Variables	Nature of relationship	Constant parameters		Describe why in terms of kinetic theory of matter
V vs P	$P \propto \frac{1}{V}$			Explain why decreasing the volume of a gas at constant temperature increases the pressure.
V vs T	$V \propto T$			
T vs P	$T \propto P$			
Moles vs V	$V \propto n$			